INVESTIGATIONS ON ICHTHYOPLANKTON IN THE PATAGONIAN SHELF OFF ARGENTINA (1)

by

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SUMMARY. – The author summarizes the investigations recently made on ichthyoplankton over the Patagonian shelf. The results of these investigations have already been published in Argentina.

RÉSUMÉ. – L'auteur résume brièvement les récentes recherches faites sur l'ichtyoplancton du plateau patagonien. Les résultats de ces recherches ont déjà été publiés par ailleurs en Argentine.

The aim of this short paper, is to present very roughly the informations which are available at present on the eggs and larvae in the waters of the Patagonian shelf off Argentina, between the latitudes 47°S and 55°S, obtained by the Argentine scientists.

The material for these investigations was obtained from the cruises performed by the Argentine oceanographic ship « Capitán Cánepa » in the years 1969 and 1970, by the Polish R/V « Professor Siedlecki » in 1973, by the German R/V « Walther Herwig » in 1978 and the Japanese R/V « Shinkai Maru » in 1978-1979. Studies on board of these three foreign vessels were performed according to the agreements between the Argentine and the respective Governments.

The published data may be found in the publications of Ciechomski (1969, 1971, 1975) ; Ciechomski, Cassia, Weiss (1975) ; Ciechomski, Weiss (1974, 1976) ; Ciechomski, Ehrlich, Lasta, Sanchez (1981) ; Ciechomski, Booman (1981) ; Ehrlich (in press) ; Weiss (1974, 1975). Some material is still in elaboration. At present, the incorporation of new Argentine research vessels will enable us to carry out new and more detailed studies.

The existing data refers to the distribution of eggs and larvae in the mentioned area of 12 species and in cases of difficulties in the species determination of the whole families (e.g. Myctophidae, Nototheniidae), in relation to the water temperature, salinity, sea bottom depth and latitudes. Also, are given the characteristics of embryonic and/or larval development of species which may be found in these latitudes, as : *Sprattus fuegensis* (Ciechomski, 1971) ; *Merluccius polylepis, M. hubbsi,* (Ciechomski, Weiss, 1974), *Micromesistius australis* (Weiss, 1974 ; Ciechomski, Booman, (1981) ; *Macrourus whitsoni, Coelorhynchus fasciatus,*

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Salilota australis (Weiss, 1975 ; Ciechomski, Booman, (1981) ; *Agonopsis chiloensis* (Ciechomski, 1975) ; *Eleginops maclovinus, Dissostichus eleginoides* and two main groups of *Notothenia spp.* (Ciechomski, Weiss, 1976); *Idiacanthus australis* (Ciechomski, 1969), *Congiopodus peruvianus* (Ehrlich, in press). Details, drawings and photographs of early live history stages of the mentioned species are presented in these papers to facilitate identification of fish eggs and larvae.

Unfortunately, we have not, up to now, informations about the development rates of embryos and larvae of the species living in the Patagonian shelf waters. Only the development rate of embryos and early larvae of *Merluccius hubbsi* in 17-19° is known.

On the basis of available data, the spawning seasons and the spawning areas of the studied species were determined. It is possible that in the case of species like *Micromesistius australis* or those of the family Macrouridae or the myctophids, the known areas of distribution of their eggs and/ or larvae are not complete due to the fact that the samples were collected by a Bongo net, from the depth not more than 100 m to the surface. It was stated by the scientists from other parts of the world that the early life stages of alike species may be found at much deeper depths.

The known areas of distribution of eggs and larvae of the most important species of fish of the Patagonian shelf are also described. In Table I attached to the present paper, are given the details concerning densities of eggs and larvae per square meter or cubic meter, temperature and depths.

The distribution of ichthyoplankton in this area, in relation to the density of zooplankton has also been investigated (Ciechomski, Sanchez, in press). The most intensive spawning of fish in the area of Patagonian shelf takes place in late winter and early spring. The existence of some relationship with zooplankton biomass was tested for ichthyoplankton values, considered as a whole, as total volume of eggs, as volume of the most important species and as total number of fish larvae. The region between 51°S and 53°S which includes spawning centres of *Micromesistius australis, Salilota australis* and *Sprattus fuegensis*, has been followed in this aspect throughout the year. In case of the blue whiting, a strong negative correlation ($r = -0.9206$, $P = 0{,}01$) was found between the egg volumes and the corresponding zooplankton biomass. Also, a strong negative correlation was obtained considering eggs of *Sprattus fuegensis* alone ($r = -0{,}8179, P = 0{,}01$). Generally, in late winter in that area, there exists a moderate though significant negative correlation between total egg volumes and the corresponding zooplankton biomass. It could be hypothesized that the inverse correlation between zooplankton biomass and zooplankton volumes is due to the fact that concentrating pre-spawning adults of planktofagous species prey heavily on zooplankton, stripping the spawning grounds of macrozooplankton.

Eggs and larvae of many of above mentioned species are present also in higher latitudes. It is the case of nototheniids, myctophids, blue whiting, macrourids and some others. An interesting problem arises from this fact. What is the population structure of a given species ? The eggs and larvae of a species found around the Malvinas Islands (=Falkland Islands) or in the intermedium waters of the shelf belong to the same population as those found e.g. in the vicinity of South Georgia or in the Scotia Sea ? In the case of *Micromesistius australis*, on the basis of studies on the adults more than one population could exist (Shubnikov, Permitin, Wozniak, 1969 ; Otero, 1976). In case of *Sprattus fuegensis* in the shelf waters, studies on morphological characteristics and some biological parameters of the adults indicate the presence of two populations of this species : one near the continental shore and another one close to the Malvinas Islands (Cousseau, in press).

In these cases, are there differences in morphological characteristics of embryos and larvae or in development rates of specimens proceeding from different areas ? This problem should be investigated with more details.

Together with the investigations on ichthyoplankton, studies on fecundity of some species in this area are performed. At present, the data concerning the fecundity of *Sprattus fuegensis* are being processed and studies of this aspect in *Salilota australis* are just begun. Studies on *S. fuegensis* fecundity were undertaken also in view of the future possibility to assess the fishery stock of adult spawners.

Table I. – Distribution and densities of some fish eggs and larvae between 47°S and 55°S in relation to temperature and sea bottom depth.

SPECIES OR FAMILY	LATITUDES °S		TEMPERATURE range (T°)		SEA BOTTOM depth range (m)		MAXIMUM DENSITIES	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
Sprattus fuegensis	50-55	47-55	5-6	6-13	90-630	30-500	760 m^2	0.9/m^3
Myctophidae	--	<47-55	--	4-16 (4-8)	--	50-1000	--	100/m^2
Salilota australis	47-55		5-8 (6-7)	5-10	80-500 (200-300)	80-500	50/m^2	0.08/m^3
Micromesistius australis	49-55	49-55	4-6 (5)	4-6	150-500 (500)	170-630	580/m^2	12.3/m^2
Macrourus whitsoni *Coelorhynchus fasciatus*	53-55		4-6		300-1000		4.5/m^2	
Merluccius polylepis		52-55		6-9		80-360		0.04/m^3
Agonopsis chiloensis		47-55		5-13		50-150		0.7
Scorpaenidae		47-55		11-13		50-120		2/m^2
Dissostichus eleginoides		53-55		5-6		100-800		0.02/m^3
Notothenia spp.		47-55		5-8 (5)		30-600		128/m^2

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